



Jobs and Economic Development Panel
Discussion Paper

ISSUE OVERVIEW

At various times, California has seen major new industries boom and fade: gold extraction, shipbuilding, aerospace and auto manufacturing, high tech manufacturing. What opportunities are emerging during the current shift in how we produce electrical energy? How should we prepare to gain the maximum benefits for our communities, or workers, and our families from this investment in new electrical power infrastructure?

BACKGROUND

Concerns over employment are prevalent and well founded.

There's no doubt that there is growing anxiety over jobs and prosperity in California since the collapse of the residential and commercial construction industry in 2008. A majority of Californians feel that the recent recession has affected their lives, and they foresee an additional four to five years of recovery ahead. Californians consistently rate their concern over jobs and the economy higher than civil rights, social justice and the environment.¹

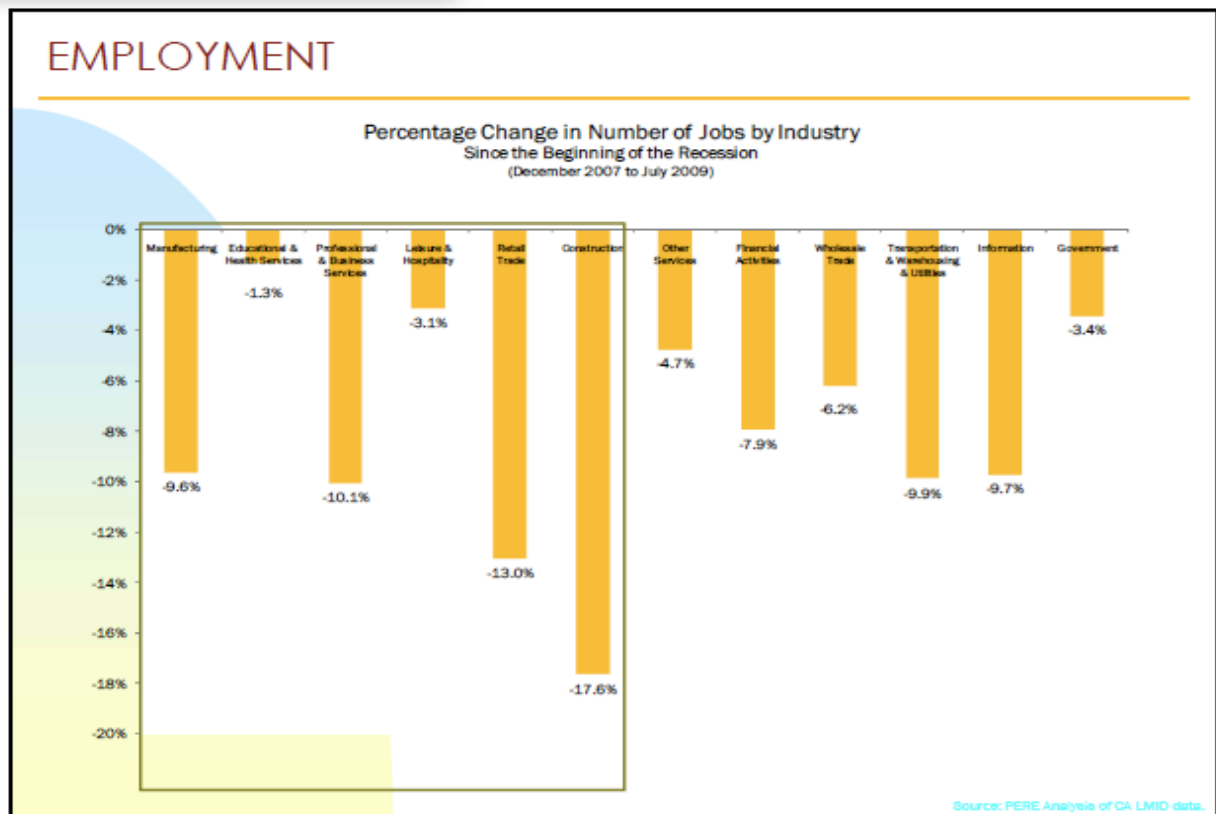
In 2009, employers in California took 6,377 mass layoff actions, resulting in separating 532,028 workers from their jobs. Between December 2009 and December 2010, most non-farm industry groups showed low levels of growth, while the construction industry actually lost another 4.6% of jobs.² Nine percent of the construction workers in the San Francisco Metropolitan area lost their jobs between October 2009 and October 2010, reflecting over-the-year jobs losses for 39 consecutive months.³ In Los Angeles,

¹ Pages 36 and 37, 20 and 21, *The California Issues Survey December 2010*. Research conducted and prepared by J. Moore Methods for the California Issues Forum

² "California Unemployment Statistics – California Unemployment Rate (most recent statistics) at www.bls.gov/eag/eag.ca.htm).

³ California Unemployment Statistics – California Unemployment Rate - San Francisco Metropolitan Area 2010 at www.Bls.gov/eag/eag.ca.htm)

the employment rate in construction dropped by 4.6% in March 2011. The last time construction employment in LA expanded was in April 2007.⁴ Overall, 60% of construction jobs in the LA area are held by immigrants, making this population one of the hardest hit by the weak construction market



Source: Manuel Pastor, *New Demography, the New Economy and the New Inequality: Tackling Poverty in a Time of Crisis* (2009)

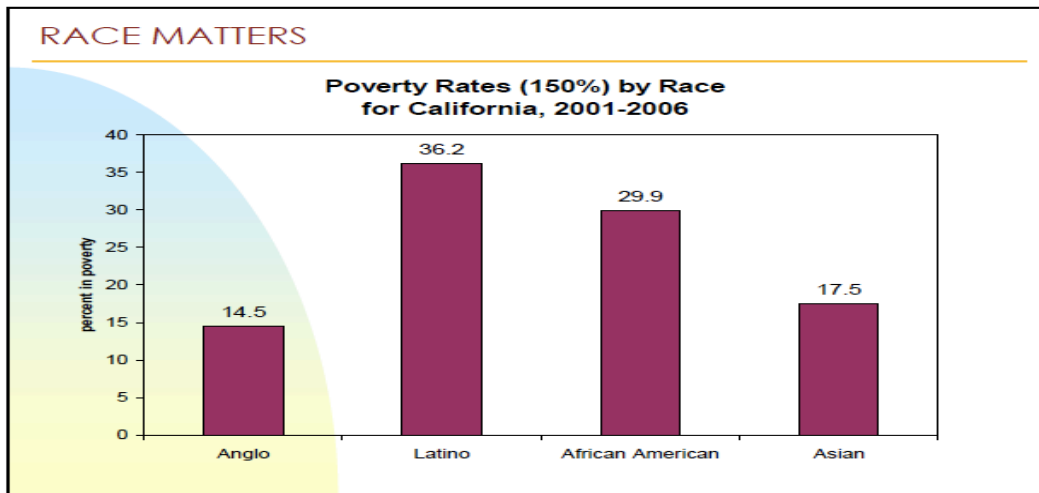
In April 2011, 2,105,200 California workers were unemployed. From April 2008 to April 2011, California experienced a 30.4% decline – a loss of 244,000 jobs. Heavy and Civil Engineering Construction and Utility System Construction Industries accounted for 28,400 of those job losses (a 29.7% decline).⁵

This problem has persisted in some communities over time – high unemployment in African American youth and limited options for upward mobility, for example. Efforts to reduce emissions of polluting gases that contribute to global climate change add another layer to California's job and economic concerns: "Even excluding agriculture,

⁴ California Unemployment Statistics – California Unemployment Rate – Los Angeles Area 2011 at www.Bls.gov/eag/eag.ca.htm

⁵ Cited from the California Employment Development Department's Labor Market website in *Clean Energy Center's input for consideration for the Governor's Working Conference on Local Energy Generation Resources*, D. Teasdale

industries in California that are considered heavy hitters of greenhouse gas emissions have a workforce that is 60% people of color, while the non-heavy emitting industries are 52% workers of color. These heavy emitting industries tend to pay slightly higher



Source: Manuel Pastor, *New Demography, the New Economy and the New Inequality: Tackling Poverty in a Time of Crisis* (2009)

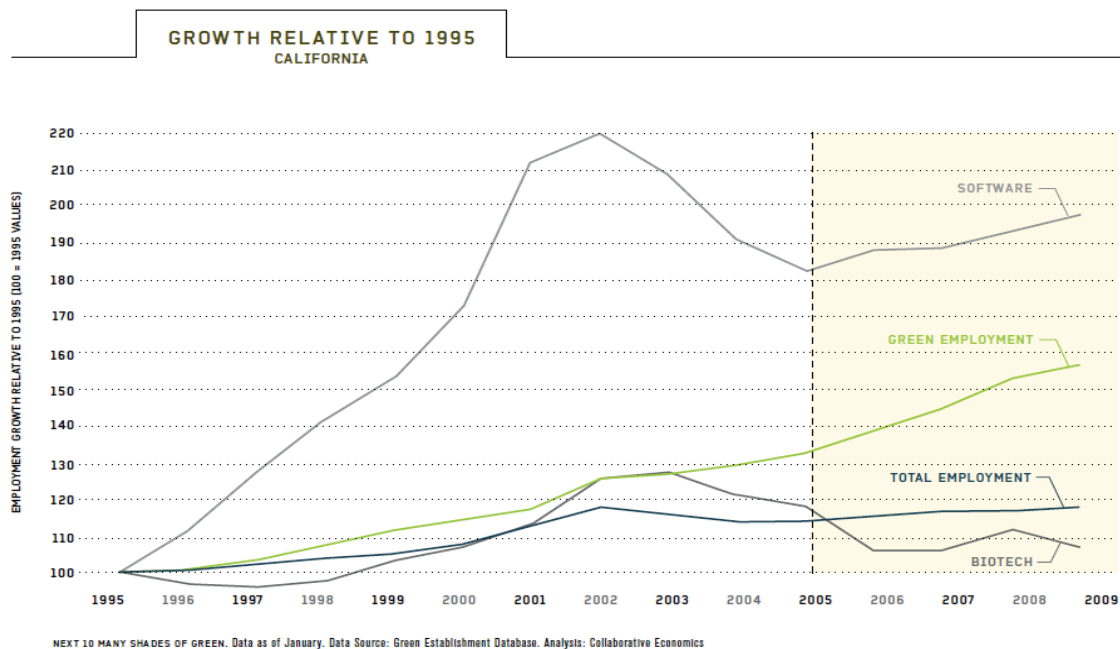
wages and be more unionized; addressing greenhouse gas emissions without an adequate plan for transition for incumbent worker and targeting opportunities for communities of color in the new 'green jobs' sector could widen the racial economic divide.⁶

⁶ Page 4, *The Climate Gap: Executive Summary –Inequalities in How Climate Change Hurts Americans & How to Close the Gap*, Rachel Morello-Frosch, Ph.D, MPH, Manuel Pastor, Ph.D., James Sadd, Ph.D, Seth B. Shonkoff, MPH. (2010)

Can green power provide jobs and prosperity?

Driven by widely supported policy changes, California's electrical generation industry is undergoing significant change. State rules require that 33% of all electrical power supplied to consumers by utilities come from renewable sources by the year 2020. Jobs in this loosely defined "green" sector are growing rapidly. From January 1995 to 2009, energy generation accounted for the largest job increases among green industry segments. "Most recently, energy generation, energy storage and clean transportation displayed above average employment growth from January 2008 to 2009. Expanding by 8% over the one-year span, energy generation added nearly 3,000 jobs. Similarly, employment in energy storage increased 11%.⁷" While the numbers remain small in comparison to the current employment needs, the rates of green sector growth are encouraging.

The two fastest growing renewable energy technologies in the United States are wind and solar. Industries that have grown from the demand for these technologies require trained workers to construct, install and maintain the energy producing facilities. In



Source: *Many Shades of Green, NEXT 10: Regional Distribution and Trends in California's Green Economy* (2011)

2009, approximately 50,000 workers were employed in the US solar power industry. This number doubled by 2010. Increases are expected to continue, but at a slower pace

⁷ Page 2, *Many Shades of Green, NEXT 10: Regional Distribution and Trends in California's Green Economy* (2011)

(estimated 26%) in 2011.⁸ A study by the Los Angeles Business Council, found that a total investment of \$2 billion dollars on rooftop solar in Los Angeles produced 600 megawatts of clean power, and yielded roughly \$225 million in wages and benefits between 2011 and 2020. An estimate for a 5 year, 150 MW program beginning in 2011 would result in 4,000 job- years⁹.

Clean energy investments create 16.7 jobs for every \$1 million in spending. Spending on fossil fuels, by contrast, generates 5.3 jobs per \$1 million in spending. Relative to spending on fossil fuels, clean energy investments create 2.6 times more jobs for people with college degrees or above, 3 times more jobs for people with some college, and 3.6 times more jobs for people with high school degrees or less.¹⁰

Los Angeles Private Investment Generated from a 10-Year 600 MW Feed-In Tariff *

Year	Installations (W)	System (\$/W) ⁽¹⁾	Total Cost	LA Cash Flow
2011	55,000,000	\$ 5.00	\$ 275,000,000	\$ 125,950,000
2011 (residential)	50,000,000	\$ 6.00	\$ 300,000,000	\$ 129,700,000
2012	55,000,000	\$ 4.50	\$ 247,500,000	\$ 119,515,000
2013	55,000,000	\$ 4.05	\$ 222,750,000	\$ 108,537,688
2014	55,000,000	\$ 3.65	\$ 200,475,000	\$ 98,455,998
2015	55,000,000	\$ 3.28	\$ 180,427,500	\$ 89,209,651
2016	55,000,000	\$ 2.95	\$ 162,384,750	\$ 86,115,006
2017	55,000,000	\$ 2.66	\$ 146,146,275	\$ 77,887,141
2018	55,000,000	\$ 2.39	\$ 131,531,648	\$ 70,378,250
2019	55,000,000	\$ 2.15	\$ 118,378,483	\$ 63,532,207
2020	55,000,000	\$ 1.94	\$ 106,540,634	\$ 57,296,383
TOTAL	600,000,000		\$ 2,091,134,290	\$ 1,026,577,323

Private Investment Sources	Description	Amount	LA Beneficiary
Project Financing **	2% Profit Margin	\$ 225,014,152	Banks
Maintenance ⁽²⁾	0.50% per year	\$ 209,113,429	Maintenance Companies & Crew
Administration ⁽³⁾	0.75% per year	\$ 313,670,143	Insurance, Leasing & Management Companies
Sales/Use Tax to the City ⁽⁴⁾	1.5% of Material Costs	\$ 8,087,453	City of Los Angeles
Subsequent Spending ⁽⁵⁾	82% of Labor	\$ 185,012,676	Gas Stations, Restaurants, etc.
System Cost	Various	\$ 1,026,577,323	Installers, Retailers & Material Manufacturers
TOTAL		\$ 1,967,475,177	

Notes:

* Figures do not take into account profit to system owner, income tax, capital expenditures for manufacturing facilities or avoided unemployment costs.

** 90% of installations are projected to be financed at 6% annual interest over 10 years; 2% profit margin is assumed to be LA cash flow (excludes administration, cost of financing, etc. which could also be funds expended in the city).

Source: Angeleno Group's private investment analysis of the UCLA study *Bringing Solar Energy to Los Angeles: An Assessment of the Feasibility and Impacts of an In-basin Solar Feed-in Tariff Program*¹¹

⁸Cited as "Renewable Power News 2011" in *Distributed Generation*, a whitepaper from the Laborers International Union of North America (LIUNA).

⁹ According to LABC's terminology, a job-year is economic investment sufficient to employ one person for one year.

¹⁰ Page 10, and page 3, *Green Prosperity: How Clean Energy Policies Can Fight Poverty and Raise Living Standards in the United States*, Political Economy Research Institute, University of Massachusetts, Amherst. June 2009.

¹¹ Angeleno Group's private investment analysis of the UCLA study *Bringing Solar Energy to Los Angeles: An Assessment of the Feasibility and Impacts of an In-basin Solar Feed-in Tariff Program*

Do we have workers with the appropriate skills to build 12,000 MW of local renewable power?

Job increases associated with growth in distributed generation (DG) are dominated by the construction industry and are strongly tied to specialty contractors.¹² The largest increases are expected in residential and nonresidential building construction. Within these industries, the need for DG skills training is expected to be high. The California Public Utilities Commission projects that demand for Energy Efficiency, Distributed Generation, Demand Response (EE-DG-DR) investments will generate 52,371 new job years by 2020 and will require at least some training for 78,204 workers.¹³ Among the largest EE-DG-DR occupations are those related to building envelope, including construction laborers. Building envelope construction includes new construction as well as retrofitting of existing buildings.¹⁴

Jobs generated by solar power as part of DG will be primarily found in manufacturing, construction and installation, and connectivity to the power grid. Construction jobs include solar panel installation on rooftops and ground systems. Jobs requiring skills training, but not a higher education degree, include solar thermal installers, solar PV installers, and solar installation supervisors.¹⁵

The Los Angeles Business Council (LABC) is commissioning a study to be released in November 2011 that identifies clusters of high solar potential overlap in economically depressed areas of Los Angeles, and where this overlap can create a market for solar jobs. The study will explore the types of jobs and training opportunities found in solar near these clusters, and identify case studies of these training programs. According to LABC, the organization will look to identify the training needed for this new market, and facilitate creation of a jobs and workforce element in a citywide Feed-in Tariff (FiT) policy, called CLEAN LA. LABC argues that while training programs, such as Homeboy Industries Solar Panel Program, have trained many youth in LA, there is no work for them without an effective policy that would create this new market to drive the economy.¹⁶

According to the Kern Community College District's Clean Energy Center¹⁷:

¹² Cited as "California Public Utilities Commission, 2010, p. 12, in *Distributed Generation*, a whitepaper from the Laborers International Union of North America (LIUNA).

¹³ *Ibid.*

¹⁴ *Distributed Generation*, a whitepaper from the Laborers International Union of North America (LIUNA).

¹⁵ *Ibid.*

¹⁶ Communication from Zarui Neksalyan and Michelle Garakian, Los Angeles Business Council (LABC) July 7, 2011

¹⁷ Interviews conducted by the author, *Clean Energy Center's input for consideration for the Governor's Working Conference on Local Energy Generation Resources*, D. Teasdale

There are many workers who possess all or most of the basic construction skills needed. But our partners anticipate a significant shortage if the pace of installation / construction accelerates. There are also many in the workforce who possess an overlapping skill set and could be ready for these types of solar projects with some accelerated short-term training. Finally, there is a larger segment of the work force who do not possess a significant portion of the required skill set, but could gain the necessary skills with 2-3 months of training.

Heavy and civil construction workers and workers with Utility system construction experience will have the most directly transferable skills to support the installation and construction of local energy generation facilities. Workers with other construction experience will have many transferable skills as well.

There will be a smaller sub-set of individuals who possess the construction and specialty skills and knowledge required to install local solar power generation systems. Many of these individuals will be asked to take on supervisory positions leading crews for the first time. This will create the need for some supervisory skills training.

What are the skills required to build 12,000 MW of renewables in local grids?

According to one major labor union, LIUNA, whose members build renewable power facilities of all types: “The construction crafts will require minimal additions to their training programs because they are already a part of both the construction and the energy industries. Construction craft laborers (CCL) currently perform many DG jobs including solar panel installation, wind turbine construction/installation, pipe laying and pipeline construction. Experience with landfill construction, building construction (commercial and residential), drilling, demolition/deconstruction and energy efficiency work is also applicable to DG job growth.¹⁸” According to Kern Community College District’s Clean Energy Center, “We believe most of the solar technician training in the state is more geared toward residential rooftop. There is a need for commercial rooftop, and larger scale ground mount installation training.¹⁹”

The Los Angeles Business Council points out a broad diversity of training options: “Other training programs are offered through LA Trade Tech College, Homeboy Industries, and the LA Conservation Corps.²⁰”

Do the unemployed meet the skills set needed?

¹⁸ *Distributed Generation*, a whitepaper from the Laborers International Union of North America (LIUNA).

¹⁹ *Clean Energy Center’s input for consideration for the Governor’s Working Conference on Local Energy Generation Resources*, D. Teasdale

²⁰ Communication from Zarui Neksalyan and Michelle Garakian, Los Angeles Business Council (LABC) July 7, 2011

Between 2008 and 2011, California's construction employment declined by 244,000 between 2008 and 2011. The 28,400 workers in the Heavy and Civil Engineering and Utility System Construction categories are currently most prepared for employment in the construction and installation of local power generation facilities with some short-term training (2-4 weeks). The other 215,600 construction workers would require somewhat longer short-term training (5-9 weeks). The other 1,816,200 unemployed who were not employed in the construction industry require (10-14 weeks) of training to be effective entry-level candidates for employment constructing and building local power generation facilities.²¹

Basic Construction Skills	Specialty Skills
<p><u>Safety</u> OSHA 10 / 30 construction certificate.</p> <p><u>Electrical</u> Basic electrical knowledge. Electrical safety.</p> <p>Trade math. Ability to reading technical drawings. Excavation and excavation safety.</p> <p><u>Power tools and hand tools</u> Knowledge of which tools to use. How to use tools safely and effectively.</p> <p><u>Job Readiness</u> How to work in a team. Effective communication skills. Workplace expectations.</p>	<p><u>Rooftop</u> Understanding roof structures and the potential for leaks.</p> <p>Knowledge of roofing repair techniques.</p> <p>Knowledge of panel racking systems and the impact that wind load calculations can have on selecting the most appropriate.</p> <p>Azimuth and selecting the most effective panel angles.</p> <p>Types of inverters and selecting the best inverters for the job and the trade-off between single inverters and micro-inverters.</p> <p>Awareness of potential system shading and how to overcome.</p> <p>How to work safely at heights and the appropriate use of personal protective equipment.</p> <p><u>Ground Mount</u> Concrete work for pilings.</p> <p>Weather considerations and loads (wind, snow, hail).</p> <p>How different tracking technology works and the trade-offs (single versus dual axis,</p>

²¹ Clean Energy Center's input for consideration for the Governor's Working Conference on Local Energy Generation Resources, D. Teasdale

	<p>versus fixed).</p> <p>Working safely with high voltage interconnections (12KV etc).</p> <p>CEQA compliance in the construction process.</p> <p>Operating heavy equipment.</p>
--	--

Should there be training standards?

According to LIUNA, “The DG industry would benefit from using workers who participate in accredited training and receive certificates which require industry accepted knowledge and demonstrated quality work practices. Certification offers:

- Portable Industry Recognized Credentials – certificates based upon industry accepted, standardized competencies would be recognized and transferable across employers, governments, and training and education organizations.
- Quality Improvement – work conducted by trained workers results in a higher quality product than work produced by untrained, less knowledgeable workers. Competency based assessments assure that workers can perform critical tasks.
- Public Safety – workers who participate in quality programs are taught proper work practices including safety procedures and use of protective equipment. Hazard awareness and attention to safety results in few accidents and reduced lost work time.
- Competitive Advantage – contractors who use and have access to trained workers can include a qualified workforce in their proposals. This reduces project lead time and projected costs and improves the bid qualification.
- Addresses Government Regulations – quality training programs address government regulations and guidance. Training will help contractors with regulatory compliance regarding work site safety, employee training, and environmental regulations.²²”

Who provides training?

California Solar Training Partnership: A partnership between the California Community Colleges, the Labor Management Cooperation Committee (IBEW-NECA), the California Center for Sustainable Energy, and the California Energy Commission. The goals of the training program are to accelerate market adoption of solar technologies by ensuring that high-quality installations are the standard and to create sustainable jobs within the solar installation industry. The program will provide

²² *Distributed Generation*, a whitepaper from the Laborers International Union of North America (LIUNA).

training for trainers and curriculum resources for community college faculty, regional occupational programs and high schools.

Kern Community College District Clean Energy Center: The Clean Energy Center offers training for Utility Workers (PowerTech), solar technicians (SolarTech) and wind turbine technicians (WindTech), funded primarily through grants from the California Energy Commission, the Employment Development Department and the Department of Labor. The Clean Energy Center training programs place more emphasis on utility-scale and commercial scale projects.

College of the Desert : Has a Clean Energy Workforce Training Program funded training for utility-scale solar construction. Their grant ended June 30 and they are seeking additional funding to continue the training.

According to Kern Community College District's Clean Energy Center, "We believe most of the solar technician training in the state is more geared toward residential rooftop. There is a need for commercial rooftop, and larger scale ground mount installation training."²³

The Los Angeles Business Council points out a broad diversity of training options: "Other training programs are offered through LA Trade Tech College, Homeboy Industries, and the LA Conservation Corps."²⁴

Apprenticeship Programs:

LIUNA's apprenticeship and journey worker training programs provide courses, certificates and certifications that will prepare workers for most of the job tasks that will be required for the construction and installation aspects of DG development. For tasks and skills that are not currently covered, LIUNA's national training organization, LIUNA Training and Education Fund, has the ability and the credentials to develop top quality training programs. Both LIUNA Training's curriculum development and instructor training processes are accredited by the International Accreditation Service (IAS). Affiliated training sites located throughout North America use LIUNA Training's accredited curriculum to train CCLs. Several sites in the Pacific Southwest are included in the LIUNA Training network. The Laborers Training and Retraining Trust Fund of Southern California uses LIUNA Training curriculum, provides renewable energy construction/installation training, and is independently accredited by the IAS for its workforce training programs.

²³ *Clean Energy Center's input for consideration for the Governor's Working Conference on Local Energy Generation Resources*, D. Teasdale

²⁴ Communication from Zarui Neksalayan and Michelle Garakian, Los Angeles Business Council (LABC) July 7, 2011

LIUNA Training and its affiliated training sites offer more than 50 different training programs in construction, environmental and residential industry specialties and in worker safety and supervisory skills. Current training and certifications are provided for a variety of jobs and tasks related to DG source development. In addition to solar panel and wind turbine installation, some relevant training programs include:

- General Construction (safety, power and hand tools, cutting and burning, engines, etc.)
- Concrete Worker (site preparation, forming, placement, finishing and curing, sawing, etc.)
- Pipelaying (trench safety, pressure pipe, polyethylene pipe fusion, utility locating, etc.)
- Hoisting and Rigging (qualified signal person, qualified rigger, refresher training)
- Green Construction
- Pipeline (front end, back end, coating, ground surface pipe handling, welding; Operator Qualification)
- Residential Construction
- Above Ground Drilling
- Residential Weatherization (Technician/Installer, Supervisor, Energy Auditor)²⁵

How do we use the market power of purchasing renewable technology to help build manufacturing in California?

California's labor and land costs often make it hard for manufacturing companies with facilities in California to compete in global economies. Still, the lure of California's large market for renewables makes the state a good business opportunity. Linking access to the market in California to manufacturing companies who produce materials for renewable power plants not only offer jobs now, but potential for industries that can continue to bring jobs and prosperity in the future, long after we've built 12,000 MW of local renewable power. Here's one example:

Soitec (SOI.PA) announced that it will build a new factory near San Diego to produce its concentrated photovoltaic (CPV) panels for use in a 150-megawatts power plant in Southern California.

Tenaska Solar Ventures is developing the power plant on 1,057 acres in Southern California's western Imperial County, and has chosen to use Soitec's Concentrix CPV panels.

The power plant, named Imperial Solar Energy Center (ISEC) West, is expected to be completed in 2015.

²⁵ *Distributed Generation*, a whitepaper from the Laborers International Union of North America (LIUNA).

Soitec said the new San Diego factory will have an annual production capacity of 200 MW, and will supply other utility-scale projects in addition to the Imperial Valley power plant.

Concentrix says its CPV solar power systems are more efficient and perform better than conventional solar systems, particularly at locations with extremely hot ambient temperatures and dry weather conditions.

San Diego Gas & Electric (SDG&E) signed a 25-year power-purchase agreement with a subsidiary of CSOLAR Development, LLC, a renewable energy company managed by Tenaska Solar Ventures that will develop and operate the ISEC West solar power plant.²⁶

CHALLENGES AND SOLUTIONS

1. Who should do the work of installing the new renewable infrastructure? How do we guarantee that these jobs can sustain working families, while keeping the cost of electrical power reasonable and affordable?
2. What part do justice and equity play in labor and employment policy? Can we use these jobs as a tool for fairly distributing economic prosperity? What are the challenges and policies we need to make that happen?
3. What other changes in our electrical supply will provide similar jobs (eg. deployment of smart grid technologies and energy efficiency), and what should we do to prepare for them?
4. Is this a short-lived construction boom? How do we make this new set of job opportunities last over time – essentially achieving sustainability in prosperity as well as energy? How do we use this opportunity as leverage to build manufacturing that allows California to gain value from selling local products outside of the state?
5. Which other barriers and obstacles to local clean power most affect opportunities for employment? Examples include: lack of financing mechanisms and regulatory uncertainty regarding third party ownership, fragmented policy and regulatory environment at the local, state and national level, lack of integration with energy efficiency efforts to optimize projects for savings and cost, lack of consistency in education alignment resulting in some regional insufficiencies in trained and experienced personnel and services.

²⁶ *Soitec Announces San Diego CPV Factory and 150 MW Power Plant*
@ <http://www.sustainablebusiness.com/index.cfm/go/news.display/id/22038>

6. What statewide policies and structures do we need to develop to make sure that we resolve these challenges and focus on the solutions outlined here? Who needs to be held accountable for success? Is this primarily part of energy policy or jobs and workforce policy? How do we coordinate better?

RECOMMENDED READINGS

Distributed Generation, a whitepaper from the Laborers International Union of North America (LIUNA).

Clean Energy Center's input for consideration for the Governor's Working Conference on Local Energy Generation Resources, D. Teasdale

The Climate Gap: Inequalities in How Climate Change Hurts Americans and How to Close the Gap, Rachel Morello-Frosch, Ph.D, MPH, Manuel Pastor, Ph.D, James Sadd, Ph.D, Seth B. Shonkoff, MPH

Many Shades of Green, Regional Distribution and Trends in California's Green Economy, Next 10, 2011

"Remove Barriers to Small-Scale Green Energy Systems," Nicole Capretz, San Diego Environmental Health Association, posted June 12, 2011 at www.voicesofsandiego.org

Green Prosperity: How Clean Energy Policies Can Fight Poverty and Raise Living Standards in the United States, Political Economy Research Institute, University of Massachusetts, Amherst. June 2009.